Program Assignment #2 (20 points)

Write a Java program that does the following:

- Prompt the user and read a number representing the temperature, then a letter representing the scale (c for Celsius, f for Fahrenheit). **If the scale given is Celsius, convert it to Fahrenheit** using this formula:
  \[ F = 1.8C + 32 \]
  where \( F \) is the Fahrenheit temperature, and \( C \) is the Celsius temperature.
**If the scale was Fahrenheit, compute the Celsius equivalent** for later display.

- Decide whether or not to read a second number, which will either represent wind speed or relative humidity, depending on the Fahrenheit value of the first number. If the first number is greater than 50 but less than 80, a second number should **not** be read, as no further calculations will be done. **The user should be informed that neither wind chill factor nor heat index can be calculated for the given temperature.**

- If the first number (in Fahrenheit) was greater than or equal to 80, read the second number and determine whether heat index can be calculated, given the information below (from **Wikipedia**):

  **Formula**

  Here is a formula for approximating the heat index in degrees **Fahrenheit**, to within ±1.3 °F. **It is useful only when the temperature is at least 80 °F and the relative humidity is at least 40%.**

  \[
  HI = c_1 + c_2 T + c_3 R + c_4 T R + c_5 T^2 + c_6 R^2 + c_7 T^2 R + c_8 T R^2 + c_9 T^2 R^2
  \]

  where

  - \( HI = \) Heat index (in degrees Fahrenheit)
  - \( T = \) ambient **dry-bulb temperature** (in degrees Fahrenheit)
  - \( R = \) relative humidity (in percent)
  - \( c_1 = -42.379 \)
  - \( c_2 = 2.04901523 \)
  - \( c_3 = 10.14333127 \)
  - \( c_4 = -0.22475541 \)
  - \( c_5 = -6.83783 \times 10^{-3} \)
  - \( c_6 = -5.481717 \times 10^{-2} \)
  - \( c_7 = 1.22874 \times 10^{-3} \)
  - \( c_8 = 8.5282 \times 10^{-4} \)
  - \( c_9 = -1.99 \times 10^{-6} \).

- If the first number (in Fahrenheit) was less than or equal to 50, **read a second number representing wind velocity and calculate wind chill factor**, using the formula below:

  \[
  \text{WindChillFactor} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})
  \]
where T is a temperature in degrees Fahrenheit, and V is the wind speed in miles per hour

- **Display the result of your calculations in a tabular form**, such as shown below:

<table>
<thead>
<tr>
<th>Celsius Temperature</th>
<th>Fahrenheit Temperature</th>
<th>Wind Speed</th>
<th>Wind Chill Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>-4 degrees</td>
<td>25 degrees</td>
<td>20 mph</td>
<td>11 degrees F</td>
</tr>
</tbody>
</table>

- Note that the table you display will differ depending on which values you calculate; you will always show the two temperatures, but your table may consist of only the temperatures or the temperatures, relative humidity, and heat index

- **Once your results have been displayed, give the user the option to run the calculations again with new data; continue to calculate and display the weather information until the user signals a desire to quit.**

Be sure to follow the guidelines for programming style and documentation, found on the assignments page. Some tips:

- Build the program incrementally. Write the temperature input/conversion part and test to make sure it works, then tackle the next problem (e.g. what to calculate next – heat index, wind chill, or neither).
- Think about the problem before you start writing code! There are several little sub-problems in this assignment; work each one out in your mind (and on paper) before you start writing Java.